

Preparatory chemistry course, Practical worksheets,

Redox reactions

1. What is the oxidation state of phosphorus in PH_3 , PCl_5 , H_3PO_4 , and P_4O_{10} , respectively?
2. Work out the oxidation state of chlorine in HCl and HClO !
3. What is the oxidation state of chromium in $\text{Cr}_2\text{O}_7^{2-}$, Cr , and Na_2CrO_4 ?
4. Do the following depict oxidation, reduction, or redox reaction?
 - a. $\text{Br}^- \rightarrow \text{Br}_2$
 - b. $\text{Ca} \rightarrow \text{Ca}^{2+}$
 - c. $\text{Cu}^{2+} \rightarrow \text{Cu}$
 - d. $\text{Cl}_2 + 2 \text{NaBr} \rightarrow 2 \text{NaCl} + \text{Br}_2$
5. In each of the following equations, indicate the element that has been oxidized and the one that has been reduced. You should also label the oxidation state of each before and after the process:
 - a. $\text{Zn} + \text{Cl}_2 \rightarrow \text{ZnCl}_2$
 - b. $\text{Mg} + \text{CuCl}_2 \rightarrow \text{MgCl}_2 + \text{Cu}$
 - c. $\text{Cl}_2 + 2 \text{Br}^- \rightarrow 2 \text{Cl}^- + \text{Br}_2$
6. Work out the half-reactions for the redox equation between copper and nitric acid:
$$\text{Cu} + \text{NO}_3^- \rightarrow \text{Cu}^{2+} + \text{NO}$$
7. Work out the equation for the reaction between iron(II) ions and dichromate(VI) ions in acid solution using the following steps as a guide:
 - a. Iron(II) ions are oxidized to iron(III) ions. Dichromate(VI) ions, $\text{Cr}_2\text{O}_7^{2-}$ are reduced to chromium(III) ions
 - b. Derive a fully balanced equation by making reasonable assumptions about anything else that might be involved.
8. Work out the equation for the reaction between chlorine and iron(II) ions. Chlorine gas oxidizes iron(II) ions to iron(III) ions. In the process, the chlorine is reduced to chloride ions.
9. Permanganates can be produced by oxidation of Mn^{2+} by strong oxidizing agents, for instance, lead dioxide which is reduced to Pb^{2+} . Work out the equation!